Technology Helps Safeguard Citizens:

Risk Assessment Data Compilations Map Quick Road to Recovery during Iowa Floods

HAZUS MH

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On June 9, 2008, Johnson County Emergency Management Director Dave Wilson anxiously watched as floodwaters rose to record levels of 28 feet upstream. Forecasts called for even more rain, painting a frightening picture for the County. Visualizing a repeat of the 1993 flood, Dave realized that using paper maps to plan response and recovery would not be a viable option.

1. Background

By the time the upstream City of Cedar Rapids crested on June 13, Dave had assembled a brain trust of agencies and individuals to help Johnson County face the imminent flood. Johnson County's Emergency Management Agency (EMA) along with emergency support functions (ESFs) coordinated loss estimation analyses for use in planning initiatives throughout the County.

The Emergency Operations Center (EOC) was bursting at the seams 2 – 3 days before the flood with standing room only for 25 people. EMA officials urgently searched for tools that could help them model the expected impacts so they could plan to reduce losses from the impending disaster.

Plotting historical data on ink paper maps to plan response and recovery routes, and using simple GIS analysis that intersects a flood boundary with building locations do not quantify a flood's impact. The EMA found HAZUS and turned to Shane Hubbard from the University of Iowa, Department of Geography (and a seasoned HAZUS user), to assess potential impacts of the flood event.

HAZUS is FEMA's powerful GIS-based software methodology that estimates potential losses from earthquakes, hurricane wind and floods; calculating physical damage and functional loss in communities. HAZUS' ability to estimate the potential impacts of a flood provided the team with an unprecedented "crystal ball" into what would likely happen when the water reaches 28 feet.

Loss estimates of displaced households allowed the Red Cross and the Salvation Army to plan their response efforts and allocate resources based on need. For example, the Johnson County Administration Building was one of the critical facilities at risk, so the County decided to move evidence (i.e. police records, computer servers) from the building to alternate sites in order to speed law enforcement's ability to recover from the flood.

> ***"The maps provided definitely assisted the Red Cross in expediting delivery of our services after the flood."***
>
> — Paul Morrison,
> Gov't Liaison Supervisor,
> Iowa Red Cross Disaster HQ

According to Shane Hubbard, emergency managers are supposed to comply with the National Incident Management System to ensure that the various emergency support functions such as hospitals and universities are involved. "Rarely do people actually follow through with this to the extent Dave did," declared Shane, "He led a consummate effort to proactively identify and rally community stakeholders during a critical time when coordination and cooperation was essential."

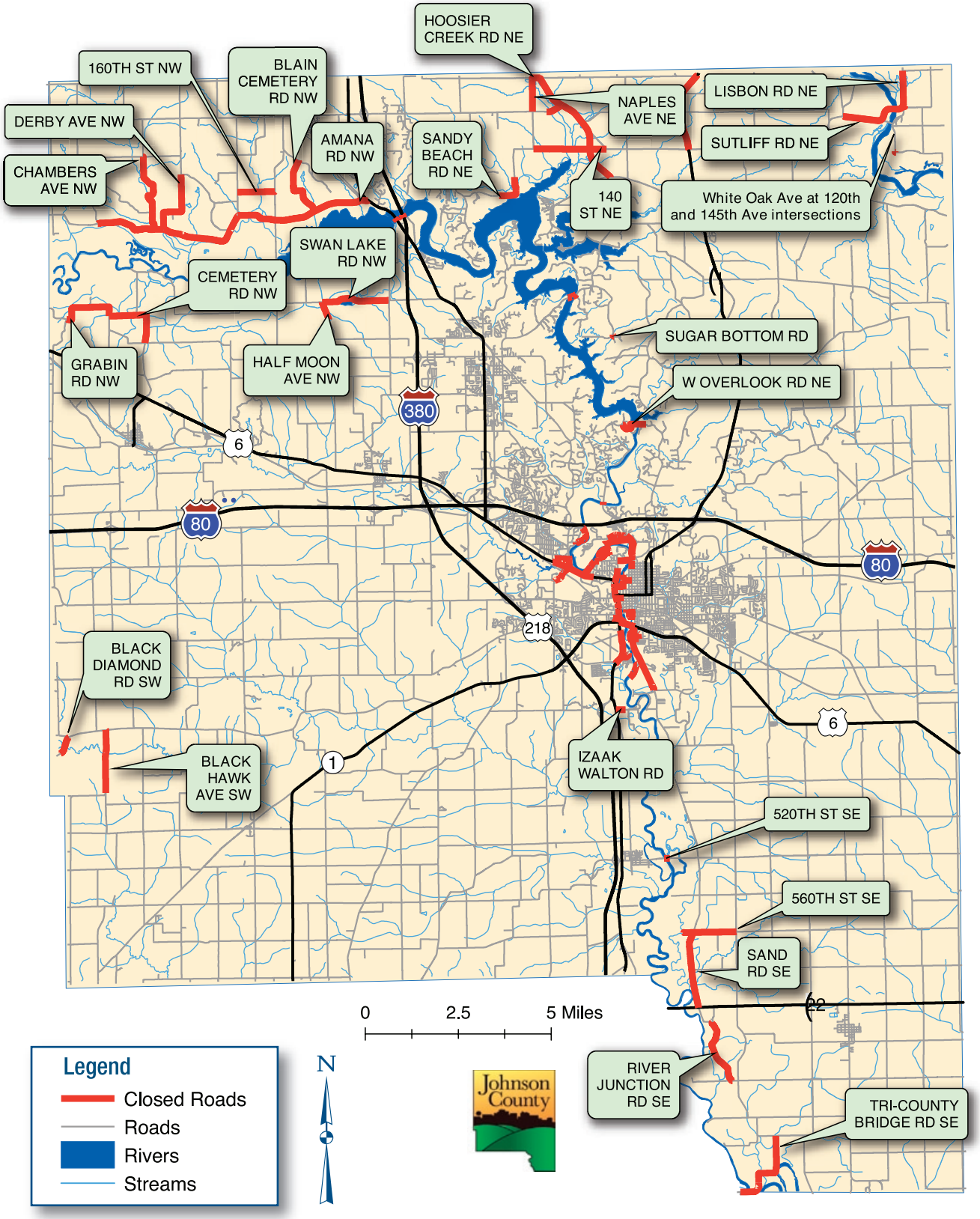
2. Data Collection

The EMA compiled data from National Flood Insurance Program (NFIP) floodplain maps, elevation data from the U.S Geological Survey (USGS), weather service updates, and forecasts into HAZUS to estimate the flood extent. A countywide dataset of building locations created from local GIS data combined with the flood extent provided even more accurate HAZUS outputs of estimated damage.

HAZUS loss estimations became a part of every morning briefing in the EOC to quantify what this flood would mean to the community in terms of direct and indirect economic losses, including potential human casualties. ESFs including the Administration Building, Red Cross, Salvation Army, Homeland Security and FEMA community relations were briefed every morning at 10:00, and then consulted to verify fine-tune HAZUS analyses based on updated data and flood criteria.

Johnson County Road Closures

As of 11:00 a.m., June 16, 2008



3. Protecting Critical Facilities at Risk

In addition to the Johnson County Administration Building, HAZUS revealed that several MidAmerican Energy substations that serve as the primary power source for Johnson County would likely flood. MidAmerican erected portable substations to ensure a prompt failover could occur if conditions required. The National Guard provided additional protection by constructing sandbag bunkers around all equipment controls.

> ***"The maps and data that you provided FEMA Community Relations were extremely useful and, so far in our experience, they have accurately predicted which structures were damaged by the flood event.***
>
> —Toby Rice, DAE, FEMA Community Relations Manager, Johnson County

"Our local operations staff worked closely with City and County officials coordinating area by area assessments. The performance of our employees, the coordination and cooperation with local officials, and response from our customers allowed us to demonstrate our ability to respond to extraordinary challenges," said Terry Smith, Director of System Control for MidAmerican Energy Company.

4. Expediting Response & Recovery Efforts

With 10 roads already closed, the EMA was able to use HAZUS to create an estimate of upcoming road closures as the flood waters continued to rise. The analysis helped EMA and its partners to navigate major arteries by showing staff where to pre-position response teams and identify open routes to hospitals and operating bridges.

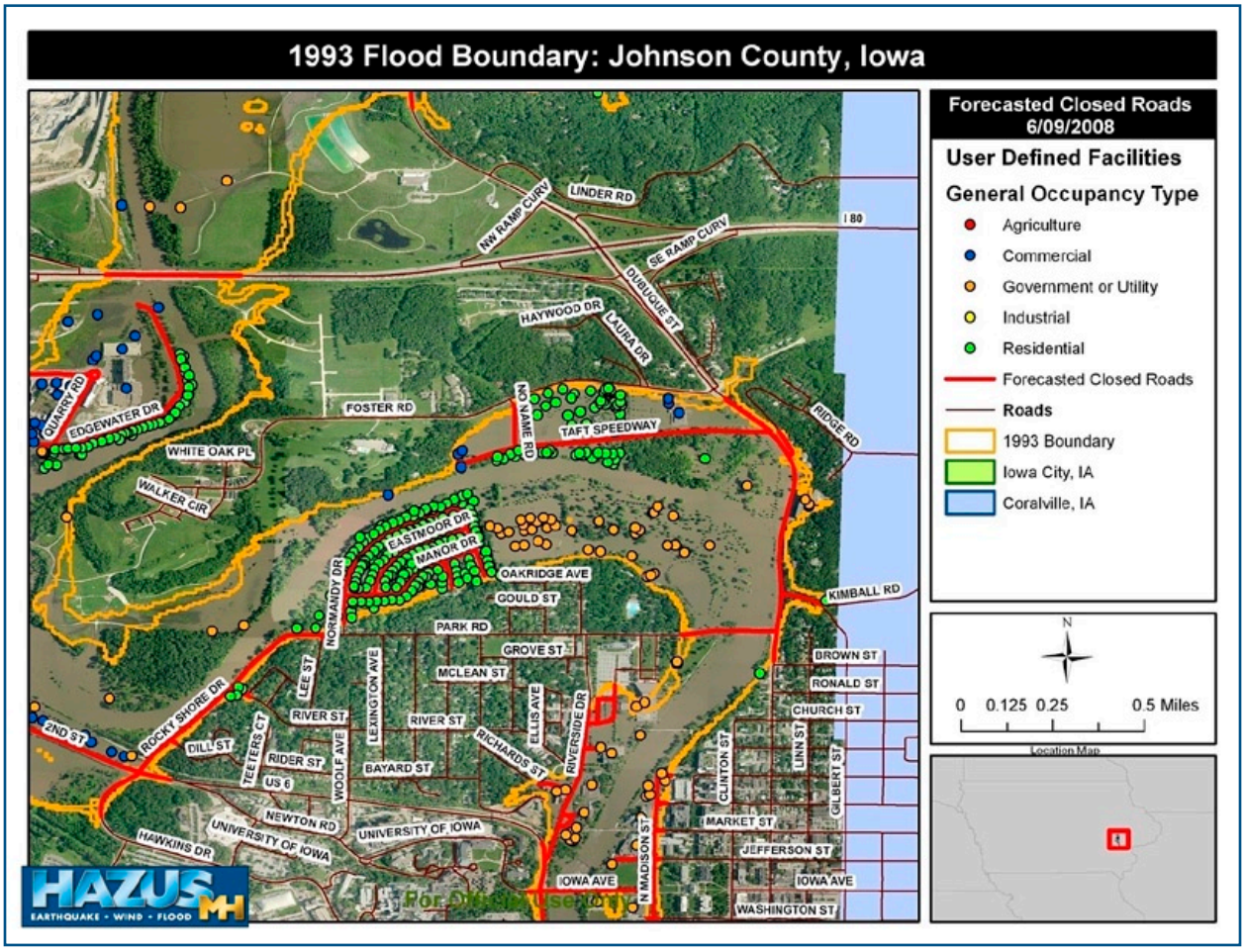
In 1993, nearly all Johnson County bridges were closed, so with floodwaters projected at similar or higher levels, the EMA was anticipating that every single bridge would be inoperable. The Iowa River cuts Iowa City in half, so the EMA was concerned they wouldn't be able to get resources to the other side of the City.

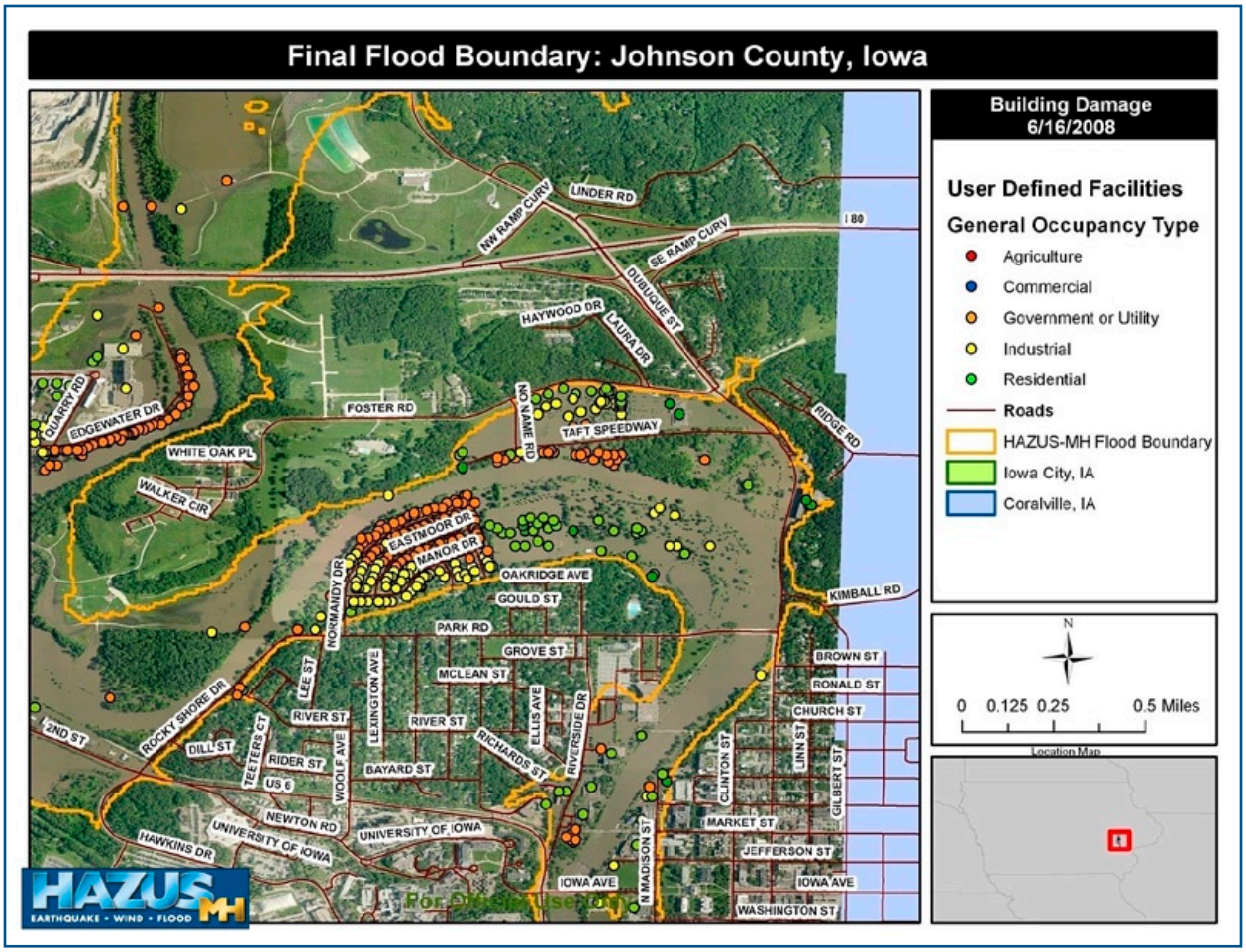
5. Risk Mitigation Measures on the Horizon

Using HAZUS they estimated 1,110 households would be displaced. Actual results show 1,250 to 1,300 households displaced from the floods. HAZUS didn't take into account cabins and secondary homes in their General Building Stock run. Johnson County GIS Coordinator, Rick Havel was very satisfied with the accuracy of HAZUS as a modeling tool.

After the Iowa floods, Johnson County was awarded a FEMA-funded Hazard Mitigation Grant Program (HMGP) Planning Grant to implement long-term hazard mitigation measures. The purpose of the grant is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster to protect citizens from future floods.

Johnson County is using HAZUS in their mitigation plans to mitigate potential issues from sheltering, displaced households and estimated casualties in hopes of preparing communities for tomorrow.





Testimonials

"The maps provided definitely assisted the Red Cross in expediting delivery of our services after the flood."

— Paul Morrison, Government Liaison Supervisor, Iowa Red Cross Disaster HQ

"The flood maps that they sent were very helpful in establishing the boundaries of the affected area. This saved a long wait to assess the damage which expedited the service delivery plan. The maps also helped us establish the estimated number of destroyed homes and identify the streets so that we could overlay a tax and school district map to get the clients help quicker. We were also able to reproduce certain segments of the map and this helped my people identify and navigate the streets better as they did their drive-by assessments."

— Mike Harman IMS/DA/MN, Damage Assessment Manager
Iowa Red Cross Disaster HQ

"The floods of 2008 were a challenge for residents, business, and governmental bodies. MidAmerican Energy provides both gas and electric service within the Johnson County area. Our local operations staff worked closely with city and county officials coordinating area by area assessments. Our goal was to ensure the safety of our customers, employees and the general public. As you can imagine, flood waters present significant challenges for both of the services MidAmerican provides (gas or electricity).

Initial efforts focused on local area assessments or predictability assessments for flooding to occur. Based on this data, MidAmerican completed a house by house effort to turn off the natural gas and remove the meters to prevent water from entering the MidAmerican system. Electricity was also turned off on a house by house basis to ensure flooded structures didn't pose additional risks. A rather substantial sandbag fortress was also constructed around some critical switch locations in Coralville that serve the Convention center and surrounding area. MidAmerican completed this effort jointly with city inspectors and county personnel. Once the waters began to recede, the same effort was required in reverse where homes and businesses could be restored. That effort continues today at a lesser scale as restoration work is completed.

From a larger view, MidAmerican also faced flooding concerns for several substation facilities. These locations provide electric service to large blocks of town with each serving 5,000 to 10,000 customers. One such location is located between the Iowa River and 1st Ave in Coralville. Our Coralville substation did sustain heavy flooding and service to the area had to be redirected from adjacent substations. Two additional locations were in jeopardy at Capitol and Prentice streets in Iowa City, and Emergency Management team was instrumental in providing us with topographical information to allow sandbagging and protection of these facilities. The University of Iowa has a similar substation across the street as well.

Further downstream in Hills Iowa, MidAmerican faced another risk at a substation that serves as a primary substation for all of

Johnson County. Again, Shane was able to provide accurate information that MidAmerican used to make decisions to ensure the reliability of the electric system. The National Guard was activated and provided additional protection with the construction of sandbag bunkers around all the equipment controls.

Based on the above information, MidAmerican was well positioned to weather the flood waters by proactively protecting the public and preserving the reliability of the electric system based on the best information available. However, all good business planning leads the organization to consider alternatives and next worse case contingencies. While confidence was high in the predictions that were based on assumed flows, the potential for upstream collapse or major changes could quickly create new problems. Shane was able to provide MidAmerican with next worse case scenario views to confirm facilities that would be at risk and alternate locations. MidAmerican moved one portable substation facility from Illinois and one from western Iowa as precautionary measures. Site locations were determined based on Shane's assistance to ensure disaster recovery locations would be well outside potential flooded areas. MidAmerican erected the portable substations and energized them to ensure a prompt cutover could occur if conditions deteriorated rapidly Fortunately, these facilities were not used and have since returned to their original storage locations.

While the flood and storms of 2008 created many financial and physical burdens for our organization, it has also been identified as the #1 accomplishment for the holdings company. The performance of our employees, the coordination and cooperation with local officials, and response from our customers allowed us to demonstrate our ability to respond to unprecedented challenges. We are deeply appreciative of the efforts from each of these groups."

— Terry L. Smith *Director, System Control MidAmerican Energy Company*

"The maps and data that you provided FEMA Community Relations were extremely useful and, so far in our experience, they have accurately predicted which structures were damaged by the flood event.

FEMA Community Relations seeks to contact residents in person at the damaged site to be sure they are aware of FEMA and other agency disaster assistance. Being able to accurately predict which structures were affected greatly increased our efficiency, as well as our confidence in knowing we could locate them in a systematic way. Of course, we are expanding the scope of our outreach in affected communities beyond your projections, but certainly your HAZUS-MH data allowed us to prioritize our efforts in Johnson County and reach as many people as possible."

— Toby Rice, DAE, FEMA Community Relations Manager, Johnson County